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EGG AND HATCHLING TAKE FOR THE KEMP'S RIDLEY HEADSTART EXPERIMENT

When the Kemp's ridley (Lepidochelys kempii) headstart experiment began in 1978 there was concern that the Kemp's ridley population was too small to support a take of eggs or hatchlings (Klima and McVey 1982). Therefore, the Kemp's Ridley Working Group, composed of representatives of Mexico's Instituto Nacional de la Pesca, the US Fish and Wildlife Service, National Park Service (NPS) and National Marine Fisheries Service (NMFS), and the Texas Parks and Wildlife Department, agreed to limit the take to less than 5% of the annual production of eggs at Rancho Nuevo (Woody 1986, 1989).

Both eggs and hatchlings were received from Rancho Nuevo beach (Tamaulipas, Mexico) for the experiment (Table 1). When eggs from Rancho Nuevo were provided for the experiment, they were incubated by the NPS at the Padre Island National Seashore near Corpus

Table 1. Take of Kemp's ridley eggs and hatchlings for the headstart (HS) experiment compared to production of eggs at Rancho Nuevo (RN).

	Production at RN[a]		RN egg-hatchling	Eggs taken for HS				Hatchlings
Year	Eggs	Hatchlings	loss rate, %[b]	Actual[c]	Estimated[d]	Total	%[e]	taken for HS[f]
1978	85217	48009	43.7	2191	2176	4367	5.1	1226
1979	98211	63996	34.8	2053	289	2342	2.4	188
1980	82374	37378	54.6	2976	463	3439	4.2	210
1981	89906	53282	40.7	2279		2279	2.5	
1982	77745	48007	38.3	2017		2017	2.6	
1983	77432	32921	57.5	2006	47	2053	2.7	20
1984	80798	58124	28.1	1976		1976	2.4	
1985	67633	51033	24.5	1978		1978	2.9	
1986	65357	48818	25.3	2011		2011	3.1	
1987	72182	44634	38.2	2001		2001	2.8	
1988	83229	62218	25.2	1019		1019	1.2	
1989	84802	66752	21.3		2556	2556	3.0	2012
1990	93937	74339	20.9		2559	2559	2.7	2025
1991	107113	76238	28.8		2810	2810	2.6	2000
1992	120964	92116	23.8		2618	2618	2.2	1994
Cumulative	1286900	857865	33.3	22507	13518	36025	2.8	9675

[a] Data from Richard Byles, U. S. Fish and Wildlife Service; personal communication, January 1994.

[b] The annual percentage loss of individuals between egg and hatchling stages at Rancho Nuevo due to all causes, calculated as follows:

$$\% = \frac{100 \text{ x (eggs produced - hatchlings produced)}}{\text{eggs produced}}$$

[c] Eggs received by the U. S. National Park Service from Rancho Nuevo for the headstart experiment. Eggs were incubated at Padre Island National Seashore and hatchlings were transferred to the NMFS Galveston Laboratory for captive-rearing (data from Shaver et al. 1988).

[d] The estimated annual number of eggs equivalent to the annual number of hatchlings taken directly from Rancho Nuevo for the headstart experiment (see footnote f), calculated as follows:

$$\text{Eggs} = \frac{\text{(hatchlings taken at RN for HS) x (eggs produced at RN)}}{\text{hatchlings produced at RN}}$$

[e] The annual percentage of eggs taken for the headstart experiment, based on the annual number of eggs produced at Rancho Nuevo, calculated as follows:

$$\% = \frac{100 \text{ x (total eggs taken for HS)}}{\text{eggs produced at RN}}$$

[f] Taken directly from Rancho Nuevo by the NMFS Galveston Laboratory.

Christi, Texas, and the hatchlings were transferred to the NMFS laboratory in Galveston, Texas for captive-rearing. When hatchlings were taken from Rancho Nuevo for the experiment, they were transferred directly to the Galveston Laboratory. For each year in which hatchlings were received directly from Rancho Nuevo, I estimated the equivalent number of eggs required to supply these hatchlings and added it to the direct take of eggs from Rancho Nuevo to obtain the annual total take of eggs for the experiment (Table 1). The annual total take of eggs was then used to calculate the percentage of the annual production of eggs taken for the headstart experiment during 1978-1992 (Table 1). This percentage fell within the 5% restriction in each year except the first in which it was 5.1%. The cumulative number of eggs taken for the experiment over all years represented only 2.8% of the cumulative production of eggs.

By contrast, the annual rate of loss of individuals between egg and hatchling stages at Rancho Nuevo ranged from 20.9% to 57.5% during 1978-1992, and the cumulative loss was 429,035 or one-third of the cumulative egg production over all years (Table 1). Even when the cumulative take of eggs for headstarting is subtracted from this cumulative loss of individuals between egg and hatchling stages at Rancho Nuevo, the resulting 393,010 individuals are still 11 times more numerous than the cumulative take of eggs for the headstart experiment. There can be little doubt that production of eggs and hatchlings at Rancho Nuevo would have been much lower without the extraordinary efforts made to protect them and the nesters that produced them. Yet, Crouse et al. (1987) concluded that sea turtle eggs and hatchlings have the lowest rankings among life stages with regard to their importance in sea turtle population growth rate. Therefore, the comparatively small take of eggs for the headstart experiment during 1978-1992 probably had no measurable deleterious effect on the Kemp's ridley population.

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A TRADITIONAL FISHERY OF LEATHERBACK TURTLES IN MALUKU, INDONESIA

The Kei Islands are located southwest of New Guinea in the Maluku province of Indonesia (5°43'S, 132°50'E). The archipelago was historically renowned for its natural diversity and beauty (Wallace, 1989), but has been subjected to intensive timber harvest during the last three decades. Many of the islands have been deforested, and local inhabitants subsist primarily on agriculture and marine resources, including turtles. Of the five species of sea turtles found in the waters of Maluku, the olive ridley and the loggerhead are encountered least often. Green turtles and hawksbills nest within the archipelago, but their numbers have been severely reduced due to poaching of nesting females, incidental capture in gill nets, take by skin-divers using treble hooks, and the collection of eggs. Leatherbacks do not nest on the islands, but are hunted in the open sea (Figure 1). The nearest leatherback nesting area is on the north coast of Irian Jaya, some 1000 km away by sea (Bhaskar, 1987). With the exception of leatherback meat, which remains within the hunters' villages, turtle meat is both consumed locally and sold in Tual on the north coast of Kei Kecil. Hawksbill shells are sold to buyers from Tual, Ambon and Jakarta who visit the remote villages in the Kei Islands regularly in search of the shells for export.

Leatherbacks frequent the waters (200-3000 m depth) off the southwestern coast of Kei Kecil throughout the year. We watched them feeding on abundant surface scyphomedusae, and six necropsies conducted during our study suggest these to be their main prey (results to be published elsewhere). In an effort to describe the traditional leatherback fishery, which has existed in this area for centuries (Compost, 1980), we interviewed fishermen, village chiefs and elders in eight villages on Kei Kecil and the adjacent islands of Ur, Warbal and Tanimbar during 2 October-13 November 1994. Interviews were standardized to determine the number of